

LM2901,LM339/LM339A,LM3302 LM239/LM239A

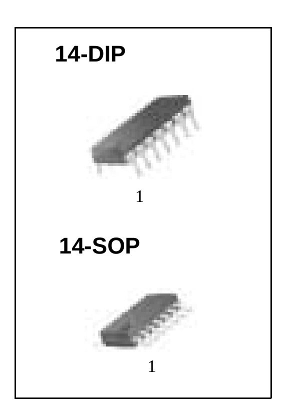
Quad Comparator

Features

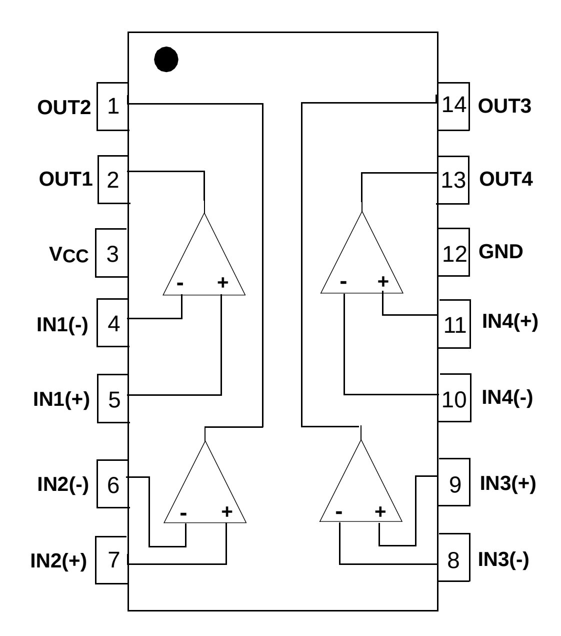
- Single or Dual Supply Operation
- Wide Range of Supply Voltage
  LM2901,LM339/LM339A,LM239/LM239A: 2 ~ 36V (or ±1 ~ ±18V)
  LM3302: 2 ~ 28V (or ±1 ~ ±14V)
- Low Supply Current Drain 800µA Typ.
- Open Collector Outputs for Wired and Connectors
- Low Input Bias Current 25nA Typ.
- Low Input Offset Current ±2.3nA Typ.
- Low Input Offset Voltage ±1.4mV Typ.
- Input Common Mode Voltage Range Includes Ground.
- Low Output Saturation Voltage
- Output Compatible With TTL, DTL and MOS Logic System

Description

The LM2901, LM339/LM339A ,LM239/LM239A, LM3302 consist of four independent voltage comparators designed to operate from single power supply over a wide voltage range.

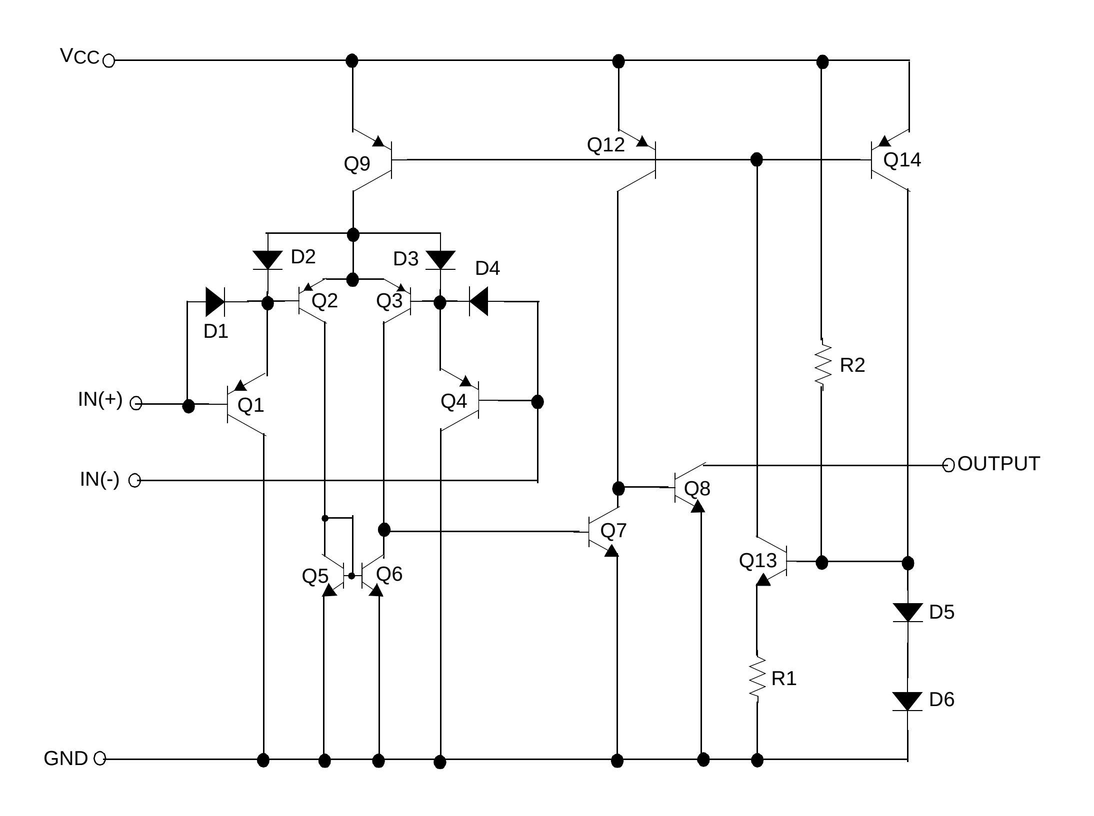


Internal Block Diagram



Rev. 1.0.2

Schematic Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	±18 or 36	V
Supply Voltage only LM3302	V_{CC}	±14 or 28	V
Differential Input Voltage	$V_{I(DIFF)}$	36	V
Differential Input Voltage Only LM3302	$V_{I(DIFF)}$	28	V
Input Voltage	V_I	-0.3 to +36	V
Input Voltage Only LM3302	V_I	-0.3 to +28	V
Output Short Circuit to GND	-	Continuous	-
Power Dissipation	P_D	570	mW
Operating Temperature LM339/LM339A LM2901/LM3302 LM239/LM239A	T_{OPR}	0 ~ +70 -40 ~ +85 -25 ~ +85	°C
Storage Temperature	T_{STG}	-65 ~ +150	°C

Electrical Characteristics

(V_{CC} = 5V, T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions		LM239A/LM339A			LM239/LM339			Unit
				Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	$V_{O(P)}$ =1.4V, R_S = 0Ω		-	1	2	-	1.4	5	mV
			Note1	-	-	4.0	-	-	9.0	
Input Offset Current	I_{IO}	$I_{IN(+)}$ - $I_{IN(-)}$, V_{CM} = 0V		-	2.3	50	-	2.3	50	nA
			Note1	-	-	150	-	-	150	
Input Bias Current	I_{BIAS}	V_{CM} = 0V		-	57	250	-	57	250	nA
			Note1	-	-	400	-	-	400	
Input Common Mode Voltage Range	$V_{I(R)}$	V_{CC} = 30V		0	-	V_{CC}-1.5	0	-	V_{CC}-1.5	V
			Note1	0	-	V_{CC}-2	0	-	V_{CC}-2	
Supply Current	I_{CC}	V_{CC} = 5V, R_L = ∞		-	1.1	2.0	-	1.1	2.0	mA
Voltage Gain	G_V	V_{CC} =15V, $R_L \geq$ 15kΩ (for large swing)		50	200	-	50	200	-	V/mV
Large Signal Response Time	T_{LRES}	V_I = TTL Logic Swing V_{REF} = 1.4V, V_{RL} = 5V, R_L = 5.1kΩ (Note2)		-	300	-	-	300	-	ns
Response Time	T_{RES}	V_{RL} = 5V, R_L = 5.1kΩ (Note2)		-	1.3	-	-	1.3	-	µs
Output Sink Current	I_{SINK}	$V_{I(-)} \geq$ 1V, $V_{I(+)}$ = 0V, $V_{O(P)} \leq$ 1.5V		6	18	-	6	18	-	mA
Output Saturation Voltage	V_{SAT}	$V_{I(-)} \geq$ 1V, $V_{I(+)}$ = 0V		-	140	400	-	140	400	mV
		I_{SINK} = 4mA	Note1	-	-	700	-	-	700	
Output Leakage Current	$I_{O(LKG)}$	$V_{I(-)}$ = 0V $V_{I(+)}$ = 1V	$V_{O(P)}$ = 5V	-	0.1	-	-	0.1	-	nA
			$V_{O(P)}$ = 30V	-	-	1.0	-	-	1.0	µA
Differential Voltage	$V_{I(DIFF)}$		Note1	-	-	36	-	-	36	V

Note:

1. LM339/LM339A : 0 ≤ T_A ≤ +70°C
   LM2901/LM3302 : -40 ≤ T_A ≤ +85°C
   LM239/LM239A : -25 ≤ T_A ≤ +85°C
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (Continued)

(V_{CC} = 5V, T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions		LM2901			LM3302			Unit
				Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	$V_{O(P)}$ =1.4V, R_S = 0Ω		-	2	7	-	2	20	mV
			Note1	-	9	15	-	-	40	
Input Offset Current	I_{IO}			-	2.3	50	-	3	100	nA
			Note1	-	50	200	-	-	300	
Input Bias Current	I_{BIAS}			-	57	250	-	57	250	nA
			Note1	-	200	500	-	-	1000	
Input Common Mode Voltage Range	$V_{I(R)}$	LM2901, V_{CC} =30V LM3302, V_{CC} =28V		0	-	V_{CC} -1.5	0	-	V_{CC} -1.5	V
			Note1	0	-	V_{CC} -2	0	-	V_{CC} -2	
Supply Current	I_{CC}	R_L =∞, V_{CC}=5V		-	1.1	2.0	-	1.1	2.0	mA
		R_L =∞,V_{CC}=30V (LM3302, V_{CC} =28V)		-	1.6	2.5	-	1.6	2.5	
Voltage Gain	G_V	V_{CC} =15V, $R_L \geq$ 15kΩ (for large swing)		25	100	-	2	30	-	V/mV
Large Signal Response Time	T_{LRES}	V_I =TTL Logic Swing V_{REF} =1.4V, V_{RL} =5V, R_L =5.1kΩ (Note2)		-	300	-	-	300	-	ns
Response Time	T_{RES}	V_{RL} = 5V, R_L = 5.1kΩ (Note2)		-	1.3	-	-	1.3	-	μs
Output Sink Current	I_{SINK}	$V_{I(-)} \geq$ 1V, $V_{I(+)}$ =0V, $V_{O(P)} \leq$ 1.5V		6	18	-	6	18	-	mA
Output Saturation Voltage	V_{SAT}	$V_{I(-)} \geq$ 1V, $V_{I(+)}$ = 0V		-	140	400	-	140	400	mV
		I_{SINK} =4mA	Note1	-	-	700	-	-	700	
Output Leakage Current	$I_{O(LKG)}$	$V_{I(-)}$ = 0V $V_{I(+)}$ = 1V	$V_{O(P)}$ = 5V	-	0.1	-	-	0.1	-	nA
			$V_{O(P)}$ = 30V	-	-	1.0	-	-	1.0	μA
Differential Voltage	$V_{I(DIFF)}$		Note1	-	-	36	-	-	28	V

Note:

1. LM339/LM339A : 0 ≤ T_A ≤ +70°C
   LM2901/LM3302 : -40 ≤ T_A ≤ +85°C
   LM239/LM239A : -25 ≤ T_A ≤ +85°C
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Typical Performance Characteristics

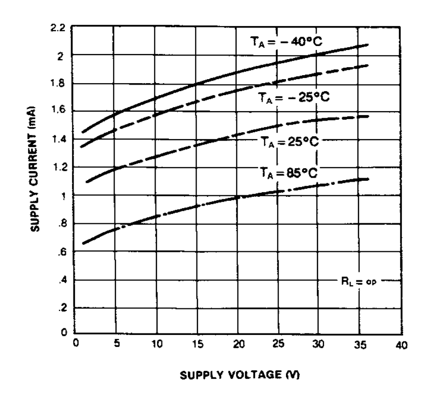


Figure 1. Supply Current vs Supply Voltage

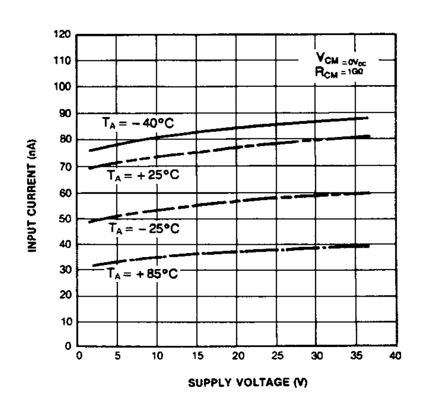


Figure 2. Input Current vs Supply Voltage

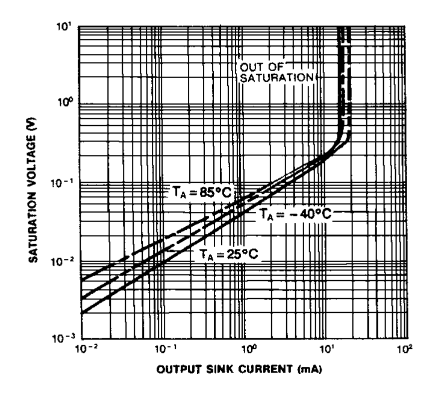


Figure 3. Output Saturation Voltage vs Sink Current

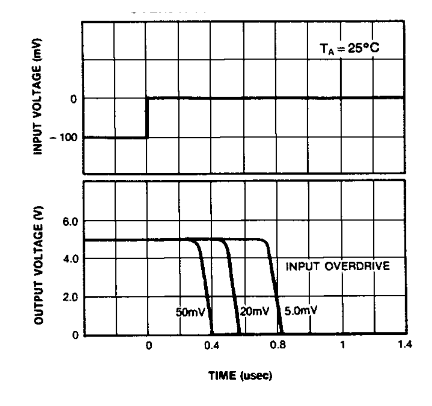


Figure 4. Response Time for Various Input Overdrive-Negative Transition

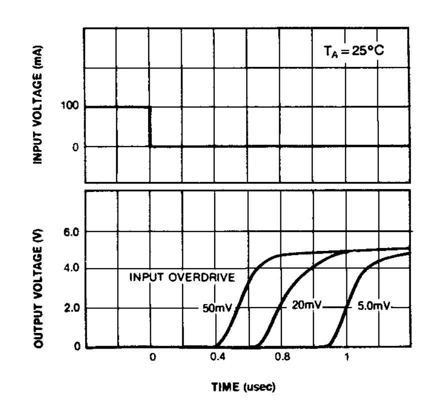
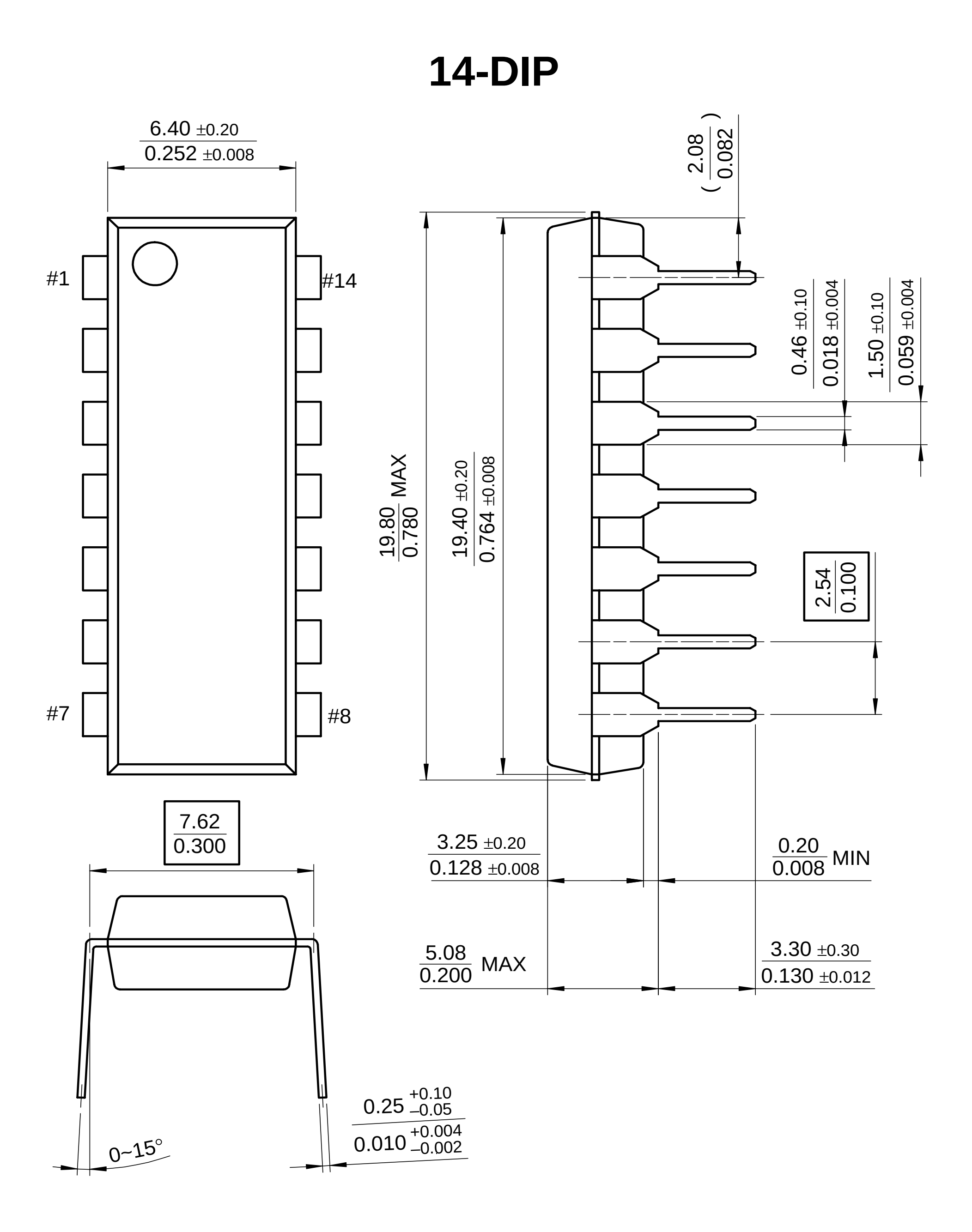


Figure 5. Response Time for Various Input Overdrive-Positive Transition

Mechanical Dimensions

Package

Dimensions in millimeters

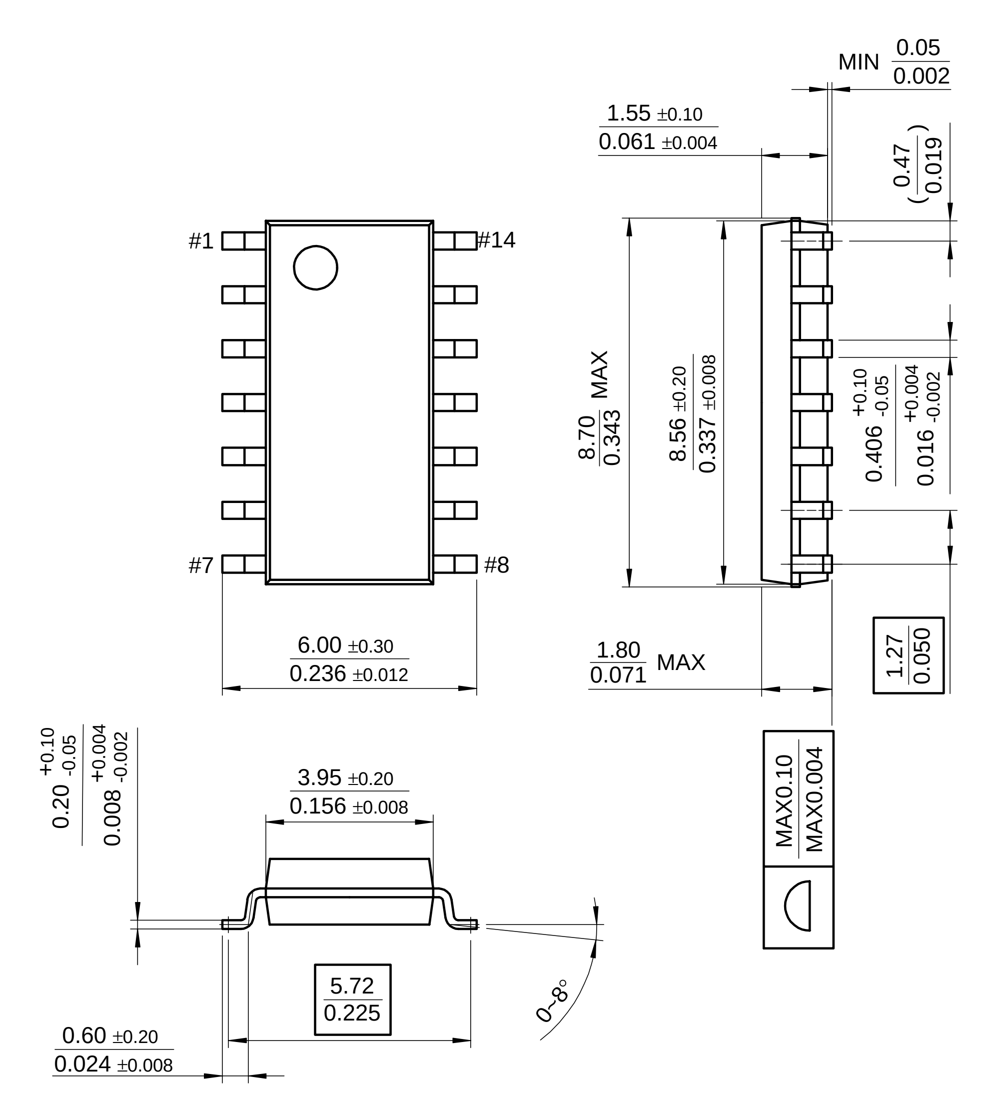


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

14-SOP



Ordering Information

Product Number	Package	Operating Temperature
LM339N	14-DIP	0 ~ +70°C
LM339AN		
LM339M	14-SOP	
LM339AM		
LM2901N	14-DIP	-40 ~ +85°C
LM2901M	14-SOP	
LM3302N	14-DIP	
LM3302M	14-SOP	
LM239N	14-DIP	-25 ~ +85°C
LM239AN		
LM239M	14-SOP	
LM239AM		

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Stock#DSxxxxxxxx